

## **CHALLENGES OF LEAN THINKING APPLICATION IN PRODUCT-SERVICE SYSTEM**

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### **ABSTRACT**

Lean thinking is claimed to be as important to services as it has been to manufacturing. However, there is yet a lack of empirical research examining the possibility of applying lean thinking in Product-Service System (PSS). This paper aims to bridge this gap by focusing on the challenges of applying lean thinking in PSS. To achieve this aim, twenty interviews were conducted with participants that have a good experience in lean implementation. Those participants are working in UK manufacturing companies that implement PSS. Also, a comprehensive review of the published literature was executed to achieve a depth understanding of the various challenges already identified by other researchers. The findings highlight a number of challenges that emerge during the application of lean thinking in PSS, among them: understanding of lean, limited communication and leadership, and defining waste.

**Keywords:** Lean thinking, Product-Service System, Challenges.

### **1 INTRODUCTION**

Lean thinking was first introduced into the field of operations management in the well-known book by Womack and Jones called “The Machine that Changed the World” (Womack et al., 1990). Lean thinking can be considered as a methodology that has its origins in the Toyota Production System (TPS) and whose principal objective is to eliminate waste and inefficiency from production systems in order to reduce costs, improve quality and reliability, and speed up cycle times (Sohal, 1996; Standard and Davis, 1999; Taylor and Brunt, 2001; Liker, 2004). So the core idea of lean involves determining the value of any given process by distinguishing value added steps from non-value-added steps, and eliminating waste so that ultimately every step adds value to the process. Lean is most frequently associated with the elimination of seven important wastes which include (overproduction, defects, unnecessary inventory, inappropriate processing, transportation, waiting, and unnecessary motion) (Shah and Ward, 2007).

The literature on lean thinking centres mostly on the manufacturing sector and especially on the automotive industry where it started. But recently because of the possible benefits gained by applying lean, other types of sectors such as the services sector (insurance companies, banks and fast food restaurant) (Bowen and Youngdahl, 1998; Goland et al., 1998; Swank, 2003; Piercy and Rich, 2009; Delgado and Ferreria, 2010), public sector (NHS, court system and government councils) (Krings et al., 2006; Radnor et al., 2006; Esain et al., 2008; Zokaei et al., 2010) and education sector (William, 2010; Barroso et al., 2010; Radnor and Bucci, 2011) have recently taken up the concept of lean thinking and introduced to their own management activities. According to Womack et al., (2005) lean thinking is not a manufacturing tactic only, but a management strategy that is applicable to all

organizations because it has to do with improving processes. All organizations are composed of a series of processes, or sets of actions intended to create value for those who use them.

However, in the literature reviewed on lean thinking, there were a very limited number of empirical research studies of the applications of lean in PSS. So the aim of this paper is to capture the challenges of applying lean thinking in PSS.

## **2 RELATED RESEARCH**

There is a long debate whether or not manufacturing and service operations can be managed based on the same concepts (Fitzsimmons & Fitzsimmons 1998). Some stress the significance of distinctive service features like, Grönroos (1990), who claimed that there are four basic characteristic that can be used to identify services:

- Services are more intangible.
- Services are activities or a series of activities rather than things.
- Services are at least to some extent produced and consumed simultaneously.
- The customer participates in the production process at least to some extent.

Also, Schlesinger and Heskett (1991) argued that services are unique in terms of customer involvement and labour intensity.

On the other hand there are many authors who argued that the distinctive features of services should not be an excuse for avoiding manufacturing concepts as a means of increasing the efficiency of service operations. For example Bowen and Youngdahl (1998) argued that lean ideas transfer well from manufacturing to services provided they were employed with minor alteration. Additionally Allway and Corbett (2002) claimed that lean principles can be applied to many service sector firms, with equally the impressive results achieved in the manufacturing sector. In 2006 Radnor asserted that lean is transferable to the public sector and can be used to develop more seamless processes, improve flow, reduce waste and develop an understanding of customer value. Radnor (2006) found that lean is a suitable methodology for improving performance and embedding a continuous improvement culture in the public sector. Similarly Swank (2003), Piercy and Rich (2009), Delgado and Ferrerira (2010) confirmed that lean approach can be applied to services.

There are some authors who suggested that services can benefit and gain the same advantages achieved through lean manufacturing, if the lean concept and tools are adapted and adjusted to cope with the organizational context. For example Johnston (1994) and Ahlstrom (2004) claimed that the principles of lean manufacturing can be applicable in service operations, but with contingencies.

## **3 RESEARCH METHODOLOGY**

The research commenced with a literature review to understand and investigate the application of lean thinking in manufacturing and service industries. Subsequently, the research aimed to determine the challenges of applying lean in PSS. The main databases used were ProQuest, Scopus, Web of Knowledge, Science Direct, EBSCO, and Google Scholar.

Twenty interviews were conducted, each interview lasted between one hour to one hour and half. Participants were selected based on some criteria like: years of experience, relation to the business strategy and the degree of involvement in the service processes. Participants were invited by telephone call or email, explaining the aim and objectives of the study. Table 1 presents the job title of the participants.

Table 1: List of participants.

Participants	Job title
1	Chief executive Officer
2	Head of Aftersales Business Development
3	CRM Manger
4	Fleet & Retail sales Manager
5	Service Manger
6	GM Strategy and Marketing
7	European Deployment Manger Lean Six Sigma

8	Business improvement Manager
9	Service Manager
10	Quality Leader

All the participants are working in UK manufacturing companies in different industry sectors (Trucks and Bus, Transportation, Document Management, and Aerospace). These companies were selected, because they have good experience in implementing the concept of PSS. Questions asked in the interviews were devised so that they captured opinions and beliefs of the participants regarding the application of lean. This included their expectations and experience of applying lean thinking in PSS and the challenges that they faced during the implementation. Examples of questions asked in the questionnaire include:

- What are the types of services that manufacturers are offering?
- What would you describe as the main challenges when adopting lean in the process of providing services to customers?
- What are the factors contributing to the success of lean implementation in the process of providing services to customers?

The answers received during the interviews were classified and analysed in order to identify the challenges and the success factors.

## 4 RESULTS AND DISCUSSION

The data analysis resulted in discovering factors related to the challenges and barriers faced during the application of lean thinking in PSS as presented in Figure 1. This section captures and discuss these challenges.

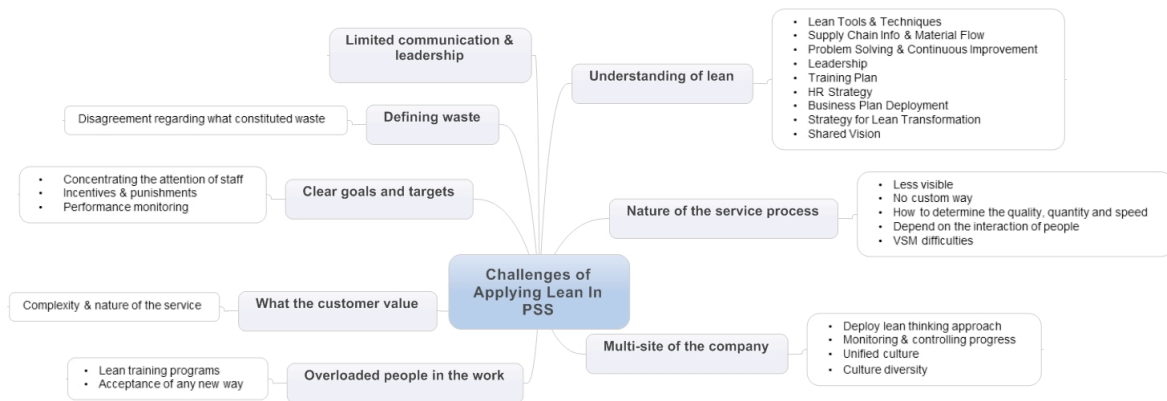


Figure 1: Challenges of applying lean in PSS

### 4.1 Understanding of lean

The answers of participants mentioned that the focus on efficiency gains have led to a number of partial implementations of lean as companies' managers have attempted to replicate the success of other without understanding the underlying principles of lean. According to Dunn, 2009 there are critical determinants that need to be put in place before organizations can embark on lean transformation. These determinants have been presented in Figure 1. At the top of the requirements are the tools and techniques, these are easily seen and readily available, thus they are often used for a quick fix. Unfortunately a through lean implementation requires all of the tasks from the bottom to the top for success. These include the development of a shared vision and an action plan. These vital components act as foundation to build on and therefore need to be carried out prior to the lean tools and techniques.

#### **4.2 Limited communication and leadership**

A major challenge for lean implementation was the observed lack of communication and leadership within the implementation phase. Changes to services which affect organizational operations need to be coordinated centrally and led from the top with a clear strategic framework to ensure it occurs systematically throughout an organization. In order for improvement to be sustainable staff must also be responsible for implementing solutions, with the full support of managers.

#### **4.3 Defining waste**

Lean thinking aims to identify waste to provide better services to customers (Westwood et al., 2006). Waste is any process that does not deliver value to the customer (Womack and Jones, 1996). From the data collected, participants defined waste as “tasks that do not add value to the customer or contribute to the efficient running of the services”.

Despite this agreed definition, participants indicate the difficulty of identifying waste. There were disagreements regarding what constituted waste.

#### **4.4 Clear goals and targets**

Central targets can be effective in concentrating the attention of staff on specific issues provided that the incentives and punishments are sufficient. However, poorly thought out targets deliver poor or perverse outcomes (Bevan and Hood, 2006; Appleby et al., 2005). Participants agreed that performance monitoring that is done badly can be harmful during the implementation phase.

#### **4.5 Nature of the service process**

The nature of the service process makes it harder to identify what needs to be changed and how to fix it where the service processes are less visible than the manufacturing processes. Manufacturing operations use a router to schedule the flow of materials through a process, so even the process has not been mapped there is still an awareness of process flow. On the other hand service processes have no custom around using routers so there is no way to know where any given piece of work is at any point in time. Moreover it is very difficult in the service processes to determine the quantity, quality, and speed required in the work. More than that, the service processes are more dependent on the interaction of people than are manufacturing processes. The nature of the service process made value stream mapping difficult since staff were unable to agree on a common approach for specific tasks. Participants agreed that demand on services is variable and unpredictable, where services varied immensely on daily basis based on the customers' needs.

#### **4.6 Overloaded people in the work**

Having too much to do with too little time to do it is a common perception in the workplace. This problem, often referred to as work overload.

There was an agreement that work overload can be one of the challenges during lean implementation. Overloaded people hinder staff to learn and accept any new way of doing the work. Although the work overload can hinder lean training programs and the degree of employee acceptance of the new approach.

#### **4.7 Multi-site of companies**

The wide spread of company makes it difficult to deploy the lean thinking approach throughout all the branches and also make it difficult to monitor and control the progress achieved in each branch. Wide spread companies also face the difficult task of developing a unified organizational culture and perspective. Cultural diversity is considered as one of the most important issues that a company can face in business because culture affects attitudes, approaches and perceptions of people and different cultures mean different attitudes, approaches and perceptions.

#### 4.8 What customer value

The lean philosophy is founded on the concept of value to the customer (Young and McClean, 2008). Defining value may be simpler to achieve in industries such as manufacturing, where the customer is easily identifiable as the next person in the process (Young and McClean, 2008). However the complexity and the nature of the service process make it difficult to easily determine what the customer needs.

### 5 CONCLUSIONS

This paper captures the challenges of applying lean thinking in PSS. Previous research projects focused mainly on the application of lean thinking either on manufacturing industries (automotive, aerospace, furniture, electrical and electronic companies) or service industries (healthcare, airlines, insurance and banking). There is little or few studies that identify the challenges of applying lean in the process of providing services attached with a product. Based on the data collected from UK manufacturing companies the challenges of applying lean thinking in PSS can be: understanding of lean, limited communication and leadership, defining waste, clear goals and targets, nature of the service process, overloaded people in the workplace, multi-site of companies, and finally what customer value.

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